



# Oxamine<sup>®</sup> used in Australian power station to eliminate biofouling in the condenser systems

## Background

A large base load power station in Australia was experiencing severe biofouling that was causing reduced heat transfer in the condenser and auxiliary cooling systems. This resulted in condenser vacuum losses and subsequent reduction in power generating efficiency and capacity. The cooling water supply is a large impound lake that is also used for recreation. Outflow from the lake goes into the local river system.

Analysis of the biofouling revealed high levels of filamentous bacteria holding the biofouling matrix together.

## Action

Oxamine was chosen over traditional chlorine/bromine or organic biocide treatment as it was expected to be more effective and more environmentally friendly having virtually no AOX produced, no organic biocide residuals, or undesirable breakdown components. The Oxamine was predicted to decompose to inert salts before returning to the inlet of the impound cooling lake.

The Oxamine program was applied to achieve the effective residual levels during the required dosing cycle.

## Results

Online coupon monitoring and internal inspections of condenser and auxiliary heat exchangers showed complete control of biofouling.

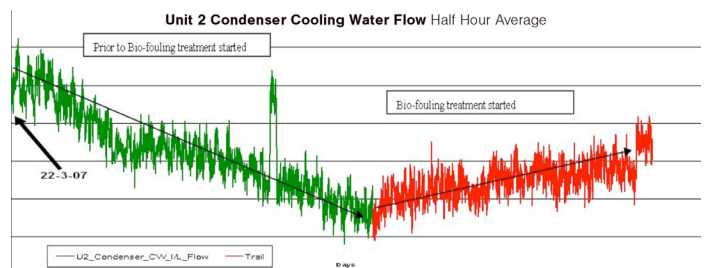


Untreated generator transformer oil cooler



Treated generator transformer oil cooler

Cooling water flows were maintained in clean condensers and improved in a condenser that was already partially fouled.



The treatment provided the customer with complete biofouling control enabling increased generation capacity and eliminating the need to take the turbo generator offline for cleaning.

## ROE

Even during high treatment levels during initial trialing the Oxamine residual in the return water to the lake was very low compared to that obtained with the previous program. The very low levels of carryover to the cooling pond proved environmentally beneficial with the power station achieving EPA approval to continue treatment on an ongoing basis.

## ROI

ROI was conservatively estimated to be over US\$ 1,000,000. The ROI estimate table presented to the customer is shown on page two. Although many of the items were estimates made by Buckman, the customer acknowledged that the ROI figures were in the vicinity of those presented.

Continued on back.



ROI estimate table

Benefits per generating unit	MW	Power price	Days	Cost per hour	Cost per generating unit
No stopping for clean. Unit availability	190	30	2	5700	\$ 273,600
Extended shut for problems/ stresses on restart	190	30	4	5700	\$ 547,200
Capital attributed to additional maintenance due to additional stresses on start-up					\$ 50,000
Bullet clean condensers			1		\$ 90,000
Additional generation capacity	2	30	150		\$ 216,000
Auxiliary cooling improvements					\$ 50,000
Biofouling cost to power station					\$ 1,226,800
<b>Costs per generating unit</b>					
Biofouling treatment cost for trial period					\$ 91,500
Chemical supply tanks per unit					\$ 7,143
Concrete pad 10m x 10m					\$ 571
Bunding					\$ 714
Connections					\$ 1,000
Subtotal costs					\$ 100,929
<b>Total saving to power station per generating unit attributable to biofouling control treatment</b>					<b>\$ 1,125,871</b>

Seller warrants that this product conforms to its chemical description and is reasonably fit for the purpose referred to in the directions for use when used in accordance with the directions under normal conditions. Buyer assumes the risk of any use contrary to such directions. Seller makes no other warranty or representation of any kind, express or implied, concerning the product, including **NO IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS OF THE GOODS FOR ANY OTHER PARTICULAR PURPOSE**. No such warranties shall be implied by law and no agent of seller is authorized to alter this warranty in any way except in writing with a specific reference to this warranty. The exclusive remedy against seller shall be a claim for damages not to exceed the purchase price of the product, without regard to whether such a claim is based upon breach of warranty or tort. W937W (11/24)